

Abstract Submitted
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Surfactant-driven dynamics of immiscible jets under microfluidic confinement¹ JOAO CABRAL, JUNFENG YANG, OMAR MATAR, Imperial College London — We examine the dynamics of three water jets in oil (PDMS) under microfluidic confinement in the presence of surfactant (sodium dodecyl sulphate). Our experimental results demonstrate the occurrence of two flow regimes, “jetting” and “dripping,” depending on the choice of system parameters; the latter are the flow-rates of water and oil, the viscosity ratio, and the surfactant concentration. In the dripping regime, the average diameter of the water droplets decreases with increasing oil flow-rate until a transition to jetting occurs. In the jetting regime, and at high oil and water flow-rates, and high oil viscosity, our results demonstrate that each jet exhibit sinusoidal deformations that appear to be either in- or out-of-phase with those of their neighbours’. Numerical simulations of the system studied experimentally are also carried out using a volume-of-fluid approach, which account for the presence of insoluble surfactant. The results of these simulations capture the trends observed in the experiments.

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